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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/845,897	04/28/1997	M. ASHRAF IMAM	77897US1	8846

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EXAMINER	
VO, HAI	

ART UNIT	PAPER NUMBER
1771	

DATE MAILED: 05/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	08/845,897	IMAM ET AL.	
	Examiner	Art Unit	
	Hai Vo	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 April 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) *5,6,8-10 and 12-16* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7, 11 and 17-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The art rejections over Tsang et al (US 4,605,595) taken individually are withdrawn in view of the present amendment. Tsang does not disclose the composite material comprising from 60 to 95% by volume of the polymeric matrix. However, upon further consideration, new grounds of rejections are made in view of newly discovered reference of JP 08-245810.

Drawings

2. The drawings were received on 04/06/2006. These drawings are acceptable.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-4, 7, 11 and 17-28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Support for the article comprising from about 60 volume % to about 95 volume % of the polymeric matrix is not found in the original disclosure. Note that the foam density is actually a measurement of mass per unit volume. Therefore, it is not clear what is meant by "a percent foam density" because specifying foam density as a percentage does not make sense at all. Further information is

needed to determine whether there exists a correlation between the foam density percentage and an open cell content as asserted by Applicants.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-3, 11, 19, 22, 23, 25, 26 and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by JP 08-245810. JP'810 teaches a wet friction material for use as a clutch in the automotive automatic transmission comprising a metal foam having a three-dimensional network with a void volume of 95% (paragraph 8). The open cell structure of the metal foam is filled with an epoxy resin by vacuum impregnation (paragraph 5). The wet friction material further contains a limited amount of a friction modifier to stabilize the friction property if necessary (paragraph 5). Likewise, the friction modifier is not a required component of the wet friction material. The impregnating material therefore substantially contains epoxy resin. It is the examiner's position that the epoxy resin occupies approximately about 95 volume % of the total volume of the metal foam. The wet friction material has a thickness of 1mm (paragraph 8). Likewise, the wet friction

material is in the form of a sheet. Accordingly, JP'810 anticipates the claimed subject matter.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 08-245810 as applied to claim 1 above, and further in view of Tsang (US 4,605,595). Tsang does not specifically disclose an aluminum foam. Tsang, however, teaches an open foam structure comprised of sheets of aluminum or nickel which are vacuum impregnated with a slurry of an epoxy resin binder which contains fillers and/or friction modifiers so as to produce a filled foam structure suitable as a friction article. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute an aluminum foam for the copper foam since aluminum foam and nickel foam have been shown in the art to be recognized equivalent metallic foams for use in friction articles.

9. Claims 17, 18, 20, 21, 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 08-245810. JP'810 does not specifically disclose pore size or the pore size relationship of the pores of the metal foam. However, it is well-

known in the art that the pore size distribution directly effects the properties of the foam. Therefore, it would have been within the level of ordinary skill in the art to have used a uniform pore sized foam, motivated by the desire to obtain a foam having substantially uniform properties along the entire length of the foam. Likewise, it would have been obvious to the skilled artisan to use a foam with gradation of pore sizes, motivated by the desire to obtain a foam with properties that vary along its length.

With regard to claim 20, a laminate containing a plurality of impregnated metal foam sheets is not literally disclosed in JP'810. However, the skilled artisan would have found it obvious to form a laminate containing a plurality of like impregnated metal foam sheets, motivated by the desire to further enhance the properties exhibited by the use of one impregnated metal foam sheet.

With regard to claim 21, JP'810 does not specifically discloses the thickness of the metal foam greater than 3 times the average diameter of the cells. However, such a variable would have been recognized by one skilled in the art as to enhance the compressive and tensile strength of the metal foam. Alternatively, it would have been obvious to the skilled artisan to prepare a metal foam having a smaller average cell diameter, motivated by the desire to have optimized the compressive, flexural, shear and tensile strength of the resulting impregnated foam. As such, in the absence of unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have optimized either the thickness of the metal foam or the average

cell diameter of the metal foam motivated by the desire to enhance the tensile strength and barrier properties of the metal foam since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. ***In re Aller***, 105 USPQ 233.

10. Claims 1-4, 7, 11, and 17-22, and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsang (US 4,605,595) in view of JP08-245810. Tsang discloses an open foam structure comprised of sheets of aluminum which are vacuum impregnated with a slurry of an epoxy resin binder which contains fillers and/or friction modifiers so as to produce a filled foam structure. Tsang discloses that the higher the content of binder, the higher the wear rate the composite material exhibits (column 5, lines 55-60). Tsang also discloses that the high content of the binder facilitates the impregnation (column 5, lines 50-60). Tsang does not specifically the percent by volume of the binder being filled the open cell structure of the metal foam. JP'810, however, teaches a wet friction material for use as a clutch in the automotive automatic transmission comprising a metal foam having a three-dimensional network with a void volume of 95% (paragraph 8). The open cell structure of the metal foam is filled with an epoxy resin by vacuum impregnation (paragraph 5). The wet friction material further contains a limited amount of a friction modifier to stabilize the friction property if necessary (paragraph 5). Likewise, the friction modifier is an optional component of the wet friction material. The impregnating material therefore substantially contains

epoxy resin. It is the examiner's position that the epoxy resin occupies approximately about 95 volume % of the total volume of the metal foam. It is the examiner's position that the epoxy resin occupies approximately about 95 volume % of the total volume of the metal foam. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the composite material having about 95% by volume of binder as taught by JP'810 motivated by the desire to facilitate the impregnation process and further provide the friction material with higher wear rate.

With regard to claims 17 and 18, Tsang does not specifically disclose pore size or the pore size relationship of the pores of the metal foam. However, it is well-known in the art that the pore size distribution directly effects the properties of the foam. Therefore, it would have been within the level of ordinary skill in the art to have used a uniform pore sized foam, motivated by the desire to obtain a foam having substantially uniform properties along the entire length of the foam. Likewise, it would have been obvious to the skilled artisan to use a foam with gradation of pore sizes, motivated by the desire to obtain a foam with properties that vary along its length.

With regard to claim 20, a laminate containing a plurality of impregnated metal foam sheets is not literally disclosed in Tsang. However, the skilled artisan would have found it obvious to form a laminate containing a plurality of like impregnated metal foam sheets, motivated by the desire to further enhance the properties exhibited by the use of one impregnated metal foam sheet.

With regard to claim 21, Tsang does not specifically discloses the thickness of the metal foam being no less than 3 times the average diameter of the cells. However, such a variable would have been recognized by one skilled in the art as to enhance the compressive and tensile strength of the metal foam. Alternatively, it would have been obvious to the skilled artisan to prepare a metal foam having a smaller average cell diameter, motivated by the desire to have optimized the compressive, flexural, shear and tensile strength of the resulting impregnated foam. As such, in the absence of unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have optimized either the thickness of the metal foam or the average cell diameter of the metal foam motivated by the desire to enhance the tensile strength and barrier properties of the metal foam since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. ***In re Aller***, 105 USPQ 233.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is

filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai Vo whose telephone number is (571) 272-1485. The examiner can normally be reached on Monday through Thursday, from 9:00 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HV

Hai Vo

HAI VO
PRIMARY EXAMINER